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Pattern and Rate of Occupational and Non-Occupational Exposures: The Experience of a Major HIV Treatment Centre in Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author SOE conceived, designed the study and wrote the final manuscript. Author TAG wrote first draft of the manuscript. Author ECH wrote the protocol. Author AZM performed the statistical analysis. Author DAO managed the analyses of the study. Author AND managed the literature searches and edited the manuscript. Author NNO read and approved final draft of the manuscript. Author OCE read, edited and approved final draft of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study sought to evaluate the nature of exposure, treatment outcome, time of presentation for treatment, assess adherence to follow up visits as well as identify gaps in post exposure prophylaxis treatment practice in the clinic.
Study Design: A retrospective cohort study.
Place and duration of Study: The HIV treatment centre domiciled at the Clinical Sciences Department of the Nigerian Institute of Medical Research Yaba, Lagos Nigeria from January 2006 to October 2015.
Methodology: A database retrospective review was conducted for adult patients who received post exposure prophylaxis for HIV during the study period. A total of 348 patients received

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treatment for post exposure prophylaxis but only 314 had complete data and were analyzed. Patient information was extracted from the electronic database and patient case files. Data were analyzed and presented using descriptive statistics.
Results: Majority of the patients were females (73.6%), aged 31-45years (47.8%), single (62.1%) had a tertiary education (67.2%) and employed (70.7%).
More than half (65.6%) had non-occupational exposures and overall, 98% presented for treatment within 72hours of exposure but only 2% completed the follow up visits.
Conclusion: Treatment outcome appears good among patients that presented for follow up visits and no sero-conversion was reported or recorded**.** The completion rate for post exposure prophylaxis was abysmally low. Strategies should be devised to encourage completion of follow up visits.

Keywords: HIV; post exposure prophylaxis; occupational exposures; non-occupational exposures.

1. INTRODUCTION

Globally, an estimated 36.7million people were living with HIV as at 2016 of which 6.1million were in western and central Africa [1]. The World Health Organization estimates an occurrence of about 3 million percutaenous exposures on annual basis among health care workers worldwide while incidence of sharps injury in Africa is said to be in the range of 2.10 to 4.68 persons per annum [2,3].

Post exposure prophylaxis is the preventive therapy given to avert the transmission of blood borne pathogen after a potential exposure to Human Immunodeficiency Virus [4].

The rationale for this stems from the fact that within the first three days of exposure there is a window of opportunity to curtail spread and replication using antiretroviral drugs as the virus is still located at the site of exposure after which the virus can spread to the lymph nodes and then gets to the blood if there is no intervention.

Most guidelines do not recommend post exposure prophylaxis treatment after 72 hours as it might be ineffective [5,6].

Occupational exposures occur in work places in a health care setting as a result of accidental contact with blood and body fluids via percutaneous injuries [2,7] and conversely non-occupational exposures arise outside the work place such as during forced or consensual sexual intercourse (heterosexual or homosexual) or sharing of needles among injection drug users [6,8].

The World Health Organization guideline stipulates that standard approved antiretroviral regimen of 28 days course is administered to an exposed individual whose HIV status has been determined within 72 hours of exposure taking into cognizance the risk category [9].

The risk category depends on volume of blood involved, extent of injury, HIV status of the source patient and the viral load. Post exposure prophylaxis has been shown to be effective in preventing HIV infection, saving lives, and will ultimately help in reducing the burden of HIV globally and achieving the goal of zero new infections [10].

In order to reduce the chances of HIV transmission via occupational exposure, health care workers are mandated to follow the universal safety precautions. World Health Universal safety precautions involve precautionary measures to prevent exposure of health care workers to infection. Despite these measures needle stick injuries are among the most common methods for occupational transmission [7,9].

Sexual assault such as rape, violence against women, homosexuality that entails receptive or insertive anal intercourse among men are very rampant worldwide and are the most common forms of non occupational exposures [6,11].

The use of antiretroviral drugs among individuals following a potential exposure to HIV has helped to prevent HIV infection. Standard procedures are required to be followed in monitoring exposed individuals as well administering recommended antiretroviral drug combinations A near perfect adherence to antiretroviral drugs is necessary to achieve a successful treatment outcome [12].

There is paucity of data in the area of post exposure prophylaxis in Nigeria. Thus there is need for more studies in this area with a view to

improve patient management .This study sought to evaluate the nature of exposure, time of presentation, treatment outcome as well as identify gaps in PEP treatment.

2. MATERIALS AND METHODS

2.1 Study Design

This is a retrospective cohort study. A database review was carried out for adult patients who were treated for post exposure prophylaxis from January 2006 to October 2015. The time of presentation at the clinic, nature of exposure, follow up visits, drug regimen and treatment outcome were analyzed.

2.2 Study Setting and Treatment Procedure

This study was conducted at the HIV treatment centre domiciled at the Clinical Sciences Department of the Nigerian Institute of Medical Research, Lagos, a Federal Government of Nigeria comprehensive HIV care and treatment centre. The treatment centre started operation in 2002 and currently have over 24,000 patients on treatment and care.

The centre provides outpatient services to adults and children as well as prevention of mother to child transmission (PMTCT) services to pregnant women. Patients are enrolled in the HIV treatment program following a referral from the HIV testing service (HTS) centre of the institute or from other HIV testing sites.

Post exposure prophylaxis treatment is also given to exposed individuals as preventive measures. Patients reporting to the clinic for post exposure prophylaxis are attended to by a clinician according to stipulated national guidelines.

An exposure history is taken and documented on the date and time of exposure, exposure site, where and how exposure occurred, type and amount of fluid, severity of exposure, exposure source (HIV status of the source if known) and details of medical status such as Hepatitis B vaccine status.

The clinician carries out a risk assessment of the exposed individual, categorizes the exposure as high or low risk and also determine the type of treatment to be offered.

The exposed individual is offered Pre-HIV test counseling based on Informed consent and ongoing counseling. A baseline HIV test is performed for the exposed individual. Other tests like full blood count, liver and renal function tests are also conducted.

If the HIV status of the source person is not known the source person will be informed of the incident and consent obtained to perform a HIV diagnostic testing.

If the source person is HIV positive or not known or refuses to be tested for HIV the exposed person is treated as high risk for HIV infection and given a PEP treatment. If the source person is negative, treatment is not necessary except if a window period is suspected. If the exposed individual is HIV negative, a 28 day course of appropriate post exposure prophylaxis antiretroviral is given depending on the risk category.

The exposed individual is expected to come for a follow up visit at two weeks, (full blood count, liver and renal function test) , six weeks (repeat HIV serology), three months (repeat HIV serology) and six months (HIV serology).

If the exposed individual is HIV positive, post exposure prophylaxis is not recommended, rather the individual is referred for further counseling and long term treatment as appropriate.

2.3 Change in National Guidelines recommendations of PEP treatment.

The Federal government of Nigeria adopts a treatment guideline termed ‘Integrated National guidelines for HIV prevention, treatment and care’ which is reviewed periodically. The earlier guideline recommended a two drug regimen of either TDF/3TC or AZT/3TC for low risk exposures and a three drug regimen of LPV/r or ATV/r or EFV + (TDF/3TC or AZT/3TC) for high risk exposures. As at 2016 the guideline recommends a three drug regimen for all post exposure prophylaxis treatment with the preferred backbone being TDF/3TC (or FTC) and EFV the preferred third drug. However LPV/r, DRV/r or RAL can be alternative options.

2.4 Study Population

A total of 348 patients received post exposure prophylaxis during the study period but only 314 had complete data and were used for the study.

2.5 Data Management

Patient information was extracted from the file maker pro electronic data base as well as patients case files. Data were entered into EXCEL (2007) spreadsheet and transferred and analyzed using SPSS version 20.

3. RESULTS AND DISCUSSION

3.1 Results

The socio demographic characteristics of the patients are shown in Table 1. Majority of the patients were female (73.6%), aged 31- 45 years (47.8%), single (62.1%) had a tertiary education (67.2%), and were employed (70.7%). A greater proportion of patients had non occupational exposures (65.6%) while 34.4% had occupational exposures.

Table 1. Socio-demographic characteristics of study participants

Characteristics	No of participants (%) N =314
Sex	
Male	83(26.4)
Female	231(73.6)
Age group	
<30	117(37.3)
31-45	150(47.8)
>45	47(15.0)
Marital status	
Single	195(62.1)
Married	108(34.4)
Separated	2(0.6)
Widowed	9(2.9)
Educational status	
None formal	8(2.5)
Primary	16(5.1)
Secondary	79(25.2)
Tertiary	211(67.2)
Occupational status	
Employed	222 (70.7)
Unemployed	92(29.3)
Type of exposure	
Occupational	108(34.4)
Non Occupational	206(65.6)

The distribution of post exposure prophylaxis treatment related factors are summarized in Table 2.

Three hundred and eight patients (98%) presented within 72 hours of exposure and majority (82%) out of these was between 48-72hours. Over half of the patients (57%) visited the clinic only once and did not complete the follow up visit while only 2% completed the follow up visits.

Table 2. Variables of exposed individuals

Variable	Frequency N=314(%)
Hours of presentation	
<24	17 (6)
24-48	31 (10)
48-72	260 (82)
>72	6 (2)
No of visits	
1 (Baseline)	178 (57)
2 (2weeks)	80 (26)
3 (6weeks)	29 (9)
4 (3months)	17 (6)
5 (6months)	5 (2)
Exposure category	
High risk	239(76)
Low risk	75(24)
Drug regimen	
ATV/r + AZT/3TC	17(5.4)
ATV/r + TDF/3TC	4 (1.3)
LPV/r +AZT/3TC	204(65)
LPV/r + TDF/3TC	14 (4.5)
AZT/3TC	70 (22.3)
TDF/3TC	5 (1.6)
No of sero conversions	Non reported

Majority (76%) of the patients had high risk exposures and were placed on the three drug protease inhibitor based regimen of either Atazanavir /ritonavir or Lopinavir /ritonavir while (24%) had low risk exposure and were on a two drug regimen. With respect to the outcome of treatment no sero conversions were reported.

Table 3 shows a distribution and occurrence of clinical events among various healthcare professionals. One hundred and eight (34.4%) had occupational exposures of which needle stick injury (93.5%) was the main cause of exposure.

Amongst the group that had needle stick injury majority were nurses (29.7%) followed by doctors (26.7%) and lab scientist (24.8%).Other events were blood splash (2.8%) and exposure to a HIV positive patient at delivery (3.7%).

Table 4 highlights a breakdown of events for non occupational exposures. Two hundred and six (65.6%) had non occupational exposures of which majority (64.1%) was rape. Majority of the

individuals that experienced rape (53%) were students. Other sexual related events were condom burst (13.1%) of which business men and bankers had the highest experience of 51.8% and 22.2% respectively. Unprotected sexual intercourse was most common among the unemployed group (22.7%) and bankers (18.1%).

Non sexual related events were taking delivery at home with bare hands (1.0%) which was noted with a farmer and an evangelist, human bite (3.4%) most common with soldiers (28.6%), manicure cut (1.5%) common among bankers and hairdressers and Injury from sharp objects common with cleaners and civil servants.

Table 3. Distribution of occurrence of clinical events among various healthcare professionals

Clinical event /occupation of patients	Frequency N=108 (%)
Needle stick injury	**101(100)**
Doctors	27(26.7)
Nurses	30(29.7)
Pharmacist	1(1.0)
Lab scientist	25(24.8)
Other health workers*	13(12.8)
Hospital cleaners	5(5.0)
Exposure to HIV +ve patient at delivery	**4(100)**
Doctor	1
Nurse	2
Other health workers*	1
Blood splash	**3(100)**
Nurse	1(33.3)
Lab scientist	2(66.7)

**Other health workers include Physiotherapists, records personnel, Community Heath Officers etc.*

3.2 Discussion

Various prevention strategies to reduce the incidence of HIV infection have been explored over the years and post exposure prophylaxis has been proven to be effective when administered according to standard recommendations.

The awareness of the importance of early presentation for post exposure prophylaxis after any form of exposure appears high as majority (98%) of the exposed individuals presented for treatment in less than 72 hours. This is similar to the findings of the study conducted in Toronto by Chan and his colleagues [13] in which 93% presented for treatment within 72hours of exposure. They also reported that only 19% presented for follow up visit at 6months which though quite low, is higher than the 2% recorded in our study. This calls for concern generally as the treatment outcome for the greater majority of patients remains unknown. Though our study recorded no sero-conversion and treatment outcome appears effective and good among the 17% that came for follow up visit at 6weeks, 3months and 6months, these results would be more affirmative if follow up visits were completed.

Table 4. Distribution of events and occupation of patients with non occupational exposures

Events / occupation of patients	Frequency N = 206 (%)
Rape	**132(100)**
Students	70 (53)
Business women	26(19.7)
Bankers	8 (6.1)
Artisans	17(12.9)
House helps	11(8.3)
Condom burst	**27(100)**
Business men	14 (51.8)
Bankers	6(22.2)
Civil servants	4(14.8)
Soldiers	2(7.4)
Students	1(3.7)
Unprotected sexual intercourse	**22(100)**
Bankers	4(18.1)
Unemployed	5(22.7)
Traders	9(40.9)
Lawyers	3(13.7)
Health worker	1(4.6)
Taking delivery at home	**2(100)**
Farmer	1(50)
Evangelist	1(50)
Human bite	**7(100)**
Soldiers	2(28.6)
Unemployed	5(71.5)
Manicure cut	**4(100)**
Bankers	2(50)
Hairdressers	2(50)
Injury from sharps	**12(100)**
Cleaners	6(50)
Civil servants	6(50)

A higher rate of non-occupational exposures (65.6%) were recorded in our study compared to occupational exposures(34.4%) contrary to findings of Elbirt *et al* in which they reported a higher rate of occupational exposures[14].

Amongst the population that presented for occupational exposures (108) in our study, majority had needle stick injury (93.5%) and this was most common among the nurses. Studies by Musa *et al* in a general hospital in Sarajevo among health care workers revealed similar findings to our study in which they reported needle stick injury as the commonest form of exposure (66.1%) and like we reported its rates were also higher among the nurses. As nurses generally administer treatment to patients, this high rate of needle stick injuries among nurses may be due to sudden movement of the patient during injections resulting in self-inflicted needle stick injury, as reported by Sharew and colleagues [3]. Heterosexual assault and rape is the leading cause of non occupational exposures (64%) in this study with a high occurrence among female students as over half (53%) of raped individuals were in this category. This is contrary to reports from more developed countries such as reports by Thomas and colleagues [11] in Canada with a high incidence of unprotected sexual intercourse amongst men who have sex with men (MSM) via insertive or receptive anal intercourse as a common form of non occupational exposure. No form of homosexual exposures among men was reported in our study and this might imply that homosexuality is not liberally practiced in our environment.

Occupational hazards among healthcare workers are inevitable [15] but its incidence can be reduced to the barest minimum with continuous training on implementation of precautionary measures. Conducting trainings routinely on universal safety precautions and proper waste disposal of sharps in health care settings is recommended. Enacting and implementing stringent legislative laws on rapist could discourage the act and female students should be educated in institutions on proper conduct and dressing especially when in the company of the opposite sex and places to avoid as well as signs to watch out for.

4. CONCLUSION

Findings from this study have shown that there is a high incidence of needle stick injury among healthcare workers as well as rape cases in females. The completion rate for PEP was also abysmally low. There is therefore need for education and increased awareness on preventive measures. Strategies should be devised to encourage completion of appointment visits.

5. LIMITATIONS AND STRENGTH OF THE STUDY

The study was retrospective and we had missing information in some patient's case files which could not be used. The study is strengthened by the large patient data accumulated over time.

CONSENT

All authors declare that written informed consent was obtained from patients for use of their data for study and those who declined to give consent were excluded from research.

ETHICAL APPROVAL

Ethical approval for the study was obtained from the Institutional Review Board, Nigerian Institute of Medical Research, Lagos Nigeria.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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